MAT121 Test 2 (Fall 2007): Derivatives

Name:

Directions: All problems are equally weighted. Show your work! Answers without justification will likely result in few points. Your written work also allows me the option of giving you partial credit in the event of an incorrect final answer (but good reasoning). Indicate clearly your answer to each problem (e.g., put a box around it). **Good luck!**
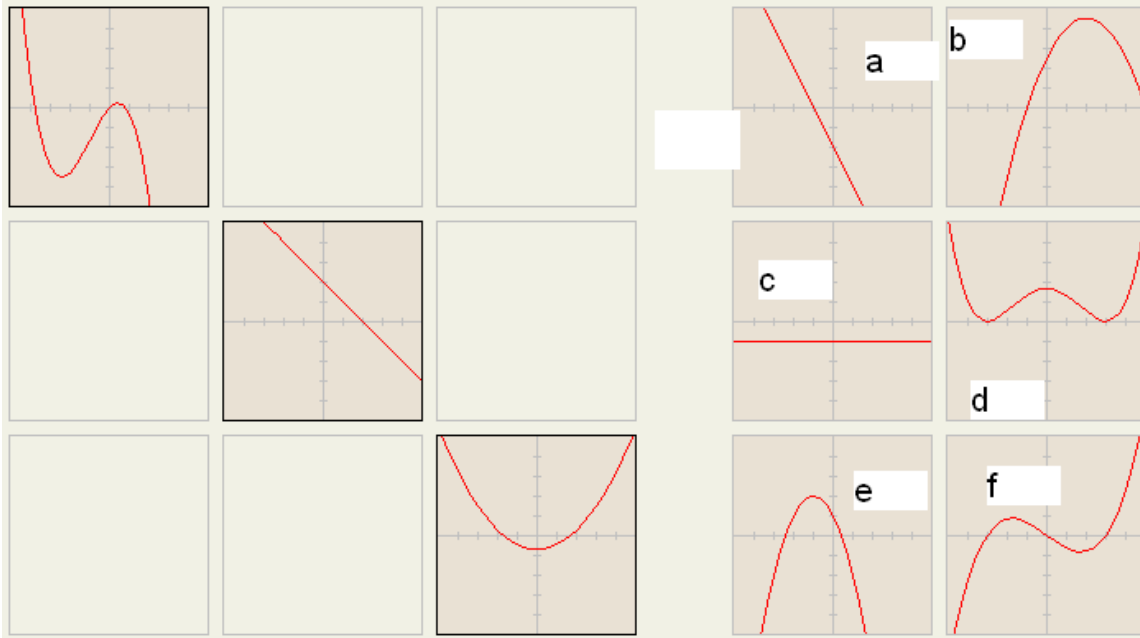
Problem 1. Consider the function f defined by

$$f(x) = \sqrt{x - 3}$$

a. (2 pts) What is the domain of f? What is its range?

b. (8 pts) Use the **limit definition** of the derivative to compute the derivative function, $f'(x)$.

Problem 2. In the "derivative puzzle" below, we have a 3x3 grid at left (with several holes), and a 3x2 grid of plots at right. Consider first the 3x3 grid at left: a single column corresponds to a function, e.g. g. In the top row we have the plot of g; in the second row, just below, we want to place the derivative g'; and in the third row, the second derivative g''.

The candidates for the "missing plots" at left are in the 3x2 grid at right. You are to write the corresponding letters of the correct plots a-f in the boxes at left, so that the functions, derivatives, and second derivatives are correctly matched.

Justify your answers for each:
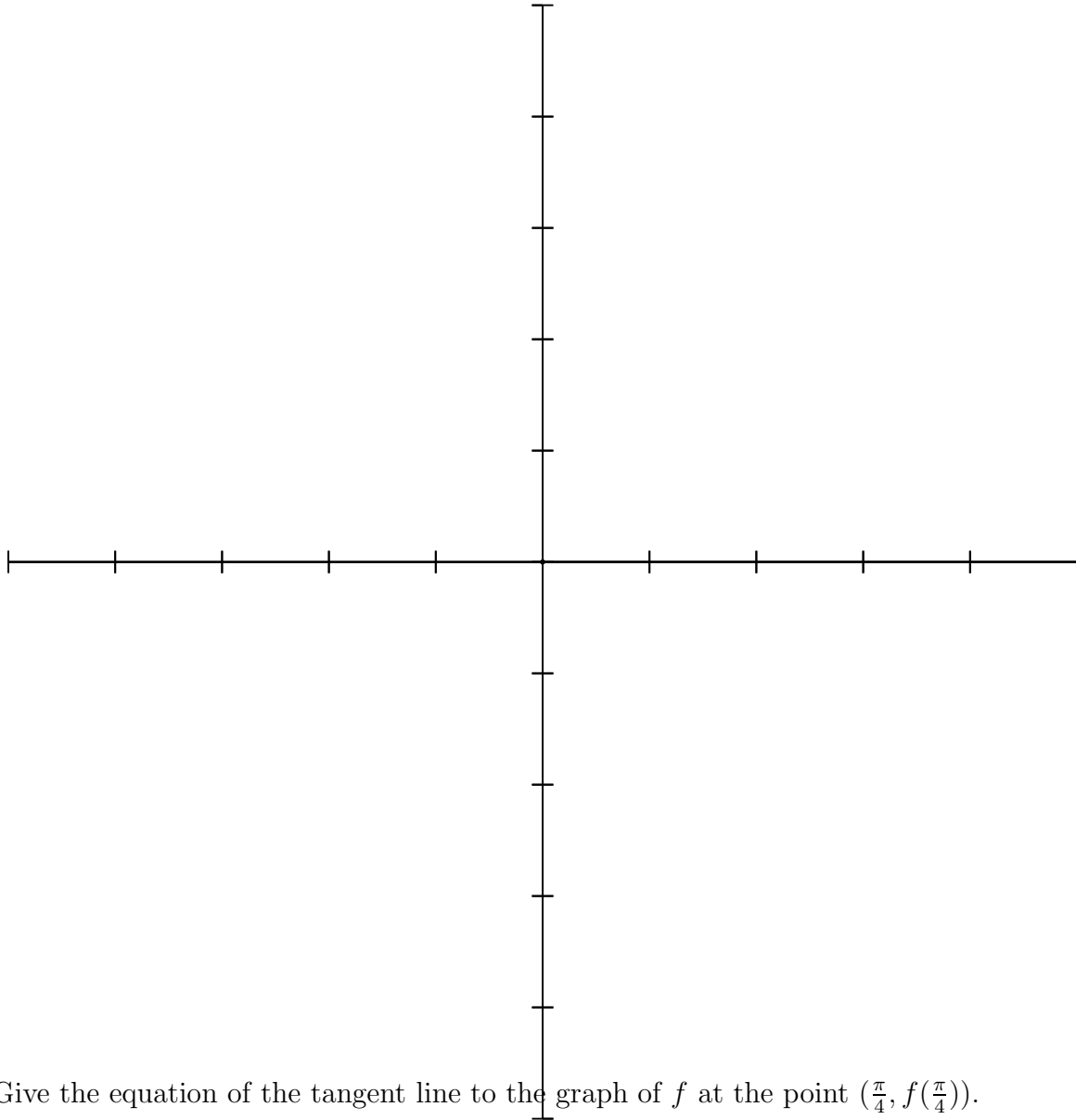
a.

b.

c.

d.

e.

f.

Problem 3. Consider the function
$$f(x) = x\tan(x)$$

a. Carefully draw the graph of a function f consistent with this information on the interval $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$.

b. Give the equation of the tangent line to the graph of f at the point $\left(\frac{\pi}{4}, f\left(\frac{\pi}{4}\right)\right)$.

Problem 4. Chain rule problem.

Problem 5. Quick and dirty derivatives